Appendix

(2) Share the Streets Program, Share the Streets Advisory Committee

Share the Streets Program

New Haven, Connecticut

A proposal for a comprehensive bicycle facility plan and near term implementation steps.

Presented by the Share the Streets Advisory Committee and the City Plan Department.

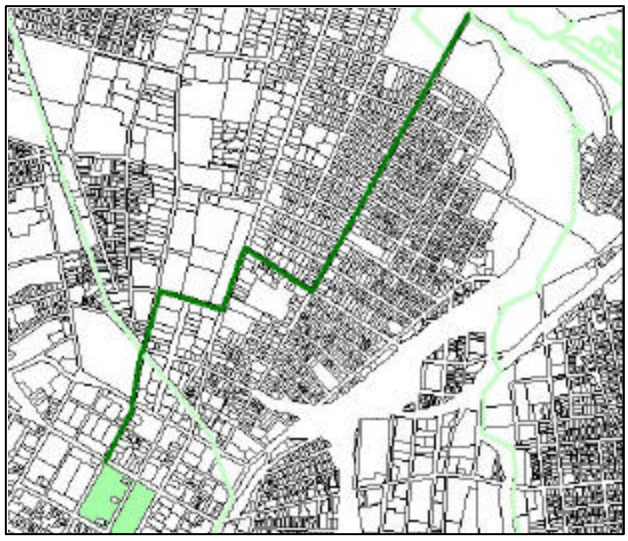
February, 2003

City of New Haven
John DeStefano, Jr., Mayor

EXECUTIVE SUMMARY

Share the Streets is a comprehensive framework for bicycle facility planning in New Haven. The framework was prepared by an ad-hoc advisory committee tasked by Mayor John DeStefano, Jr. to better accommodate the cycling public through a series of short- and long-term initiatives. Bicycle planning is an integral component to intermodal transportation solutions which ease congestion, improve air quality and promote active living. Moreover, the initiative enhances the quality of life and sense of place in the city.

With this in mind, the Share the Streets Advisory Committee met on a weekly basis during the winter of 2002-03 and provides this report for public consideration. Of note, the committee recommends immediate accommodation of the large bicycle commuting population in the East Rock and Downtown neighborhoods and enhanced facilities (bike racks) as appropriate. Following the successful implementation of a pilot route (see below) and the opening of the Farmington Canal Line, the Advisory Committee further recommends development of a citywide bicycle plan which includes tangible actions related to education, regulation and construction.



Proposed pilot bicycle route

The Advisory Committee recommends an initial bicycle route between Orange Street at the base of East Rock Park and the New Haven Green. Although the route is under two miles and costs less than $15,000, it is an important step in building support for, and usage of, non-motorized transportation in the city. With appropriate signage and educational efforts, the route forms the basis for systematic improvements to the city's roadways – seamlessly integrating bicycle planning with stormwater management, repaving and maintenance programs and signalization projects.

The Advisory Committee looks ahead to a timely roll-out of the pilot route and to a cooperative, long-term relationship for future implementation steps.

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Special thanks: Special thanks to Stephen Harris, Planner for his work in convening meetings of the Share the Streets Advisory Committee and in facilitating and drafting this report.

PART ONE:

Introduction, Setting, and Background

Mission Statement

The City of New Haven seeks to create and maintain an integrated system of pedestrian and bicycle facilities. These facilities will provide safe, convenient travel for walkers and bicyclists throughout the city. The city recognizes the need to encourage walking and bicycle travel for transportation, recreation, and exercise. Walking and bicycle use conserves energy, contributes to cleaner air, reduces traffic, reduces the need for automobile parking, and improves personal fitness.

Purpose:

The purpose of the Bicycle Plan is to improve and encourage bicycle transportation in the City of New Haven. This effort is part of the transportation portion of the city's Comprehensive Plan of Development and Conservation.

Setting:

The City of New Haven is the financial, business, and cultural hub of South Central Connecticut. It lies at the nexus of Interstates 91 and 95 and boasts southern New England's busiest rail station. New Haven is also home to Long Island Sound's largest working harbor and the city is engaging in efforts to develop ferry service. Together with an existing and expanding walking/biking trails system, New Haven indeed is an intermodal transportation hub for the region.

New Haven is also home to several highly successful higher education institutions, including Yale University (located Downtown), Albertus Magnus College, Southern Connecticut State University and Gateway Community College. This cluster of institutions devoted to higher learning helps to make the city a vibrant, intellectually stimulating place for people to live and businesses to locate.

New Haven is fortunate to have many fine large parks and public squares, a legacy of the City Beautiful movement from the early 20th century. The most notable features are two promontories, East Rock and West Rock, which overlook the city, and its harbor. The city is currently developing the historic Farmington Canal Line, which runs from the Hamden border south through the city to Long Wharf, into a linear park for bicyclists and pedestrians. The Farmington Canal Line Greenway is part of the East Coast Greenway, which is intended to create a recreational trail from Maine to Florida. This green space

will eventually connect with other existing and planned trails, forming a bike and pedestrian network in and out of the city.

This setting in New Haven is in keeping with similar municipalities with higher educational institutions (eg. Madison, Wis. and Northampton, Mass.). These places have taken advantage of their unique setting and implemented highly successful bicycle plans.

Background:

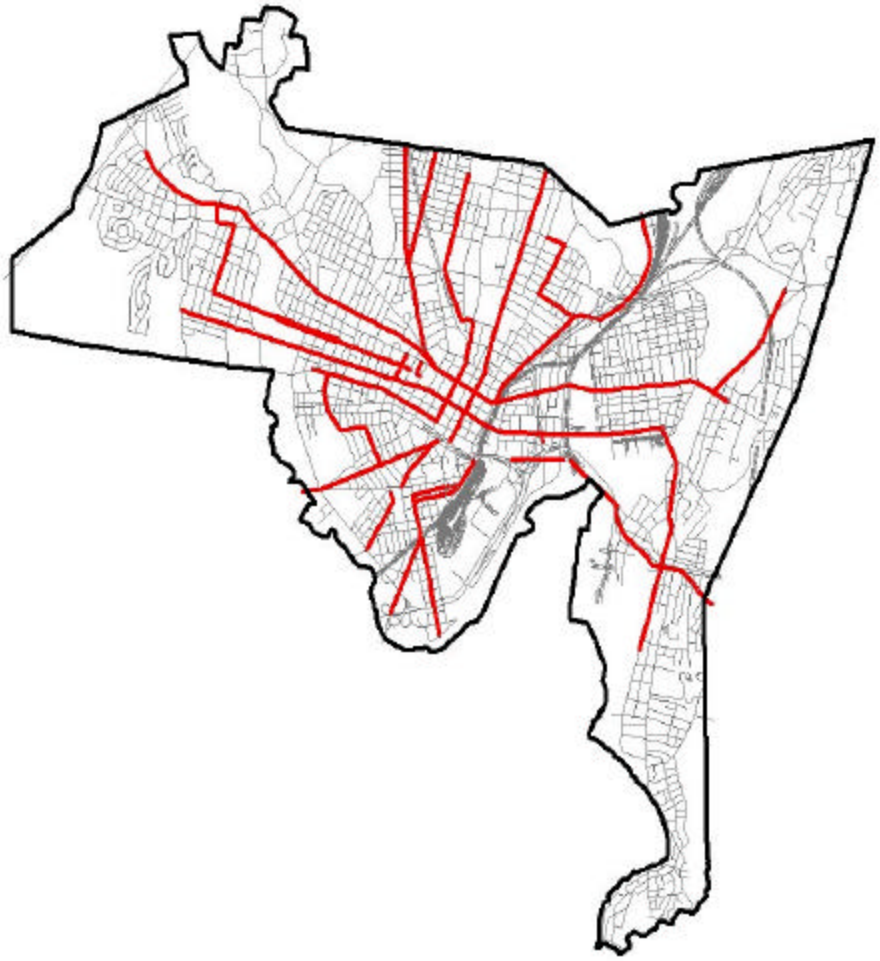
New Haven has long been the transportation hub of the region. Long Wharf pier, originally more than a ½ mile long, was the city's first means of connecting to the wider world. As the industrial revolution began, the railroad was built to help the city develop its industrial base and an extensive electrical trolley system was developed to ferry people and goods about the city.

With the advent of the automobile and the interstate highway system, the face of the city underwent great changes. The once extensive trolley system was removed and new limited access highways were constructed, severing the connectivity between neighborhoods and disrupting pedestrian access to downtown. The subsequent automobile-dependency tilted a once diverse transportation system. A city bus system replaced the trolleys. CT Transit is now operated by the Connecticut Department of Transportation, but service cuts are increasingly frequent.

The city seeks to encourage use of mass transit, biking and walking. New Haven has a noticeably large segment of its population that walks to work (14%). This is attributed in part to neighborhoods within walking distance of major employers and to a high number of low-income households without automobiles.

Biking and walking are viable alternatives for recreation and commutation in light of enhanced public safety (major crimes were down 54% from 1990 to 2000); a national consciousness about air pollution and global warming; and the health dangers of an increasingly sedentary American lifestyles. The creation of a bicycle and pedestrian friendly system is one step in this direction.

New Haven Trolley System: 1925



Current Conditions:

Today, New Haven is an auto-oriented city, which often causes parking and congestion problems for both residents and commuters. A comprehensive bicycle facilities program, together with improved mass transit, will help relieve current traffic and parking problems by encouraging more people to bike to work or to shop.

For the most part, pedestrians are able to navigate the city using an extensive system of sidewalks. However, unnecessarily wide streets, poorly lit sidewalks under bridges, and high-speed traffic do hinder pedestrian movement.

Although New Haven's compact size and relatively flat topography make it a potentially wonderful city for bicyclists, current conditions marginalize bicycle mobility since street system is automobile-oriented. Wide streets that encourage speeding, a confusing proliferation of one-way streets, and the nearly universal (and necessary) on-street parking arrangements all conspire to make the city a hostile environment for bicycles.

Bicycle transportation in urban areas is a significant transportation option not well provided for in New Haven. According to the 2000 Census, 589 people use bicycles to get to and from work each day despite the lack of a bicycle facilities plan (see the maps section of the appendix). In the absence of a plan, the city's bicycle enthusiasts and, more importantly, those who rely on bicycles as their primary means of transportation, have developed an unofficial system. The system is used year-round by residents of various ages and income levels for commuting and recreational purposes.

The challenge, therefore, is to take a cue from this informal system of bike routes and devise a formal, logical and coherent bicycle transportation system and fold it into the city's overall transportation plan.

Ad Hoc Share the Streets Committee:

At the request of Mayor John DeStefano, Jr., an ad-hoc committee was formed to find ways to make the city friendlier to bicycles and pedestrians. Members of various bicycle interest groups were contacted and have worked with city staff on this report. This is not a static group; new members are welcome at any time. A complete list of current members can be found in Appendix C. Additional comments made by residents can be found in Appendix E.

The committee's activities focused around two major issues: (1) to decide on an initial recommendation for spring, 2003; and (2) to propose a long-term set of goals to help transform the city's auto-dependent transportation system into a more balanced system.

Working in conjunction with city departments, the committee has been meeting weekly in order to fulfill its mandate. The first task was to choose a bike route for a spring initiative. Since the East Rock neighborhood has the highest number of bike-to-work trips according to the 2000 Census, it was decided that the first proposed bike route run between East Rock to downtown. A map of the proposed initial route can be found in Appendix D. The bike route will be marked by signs and on the pavement.

In the future the committee, continuing its working relationship with city departments, will plan for and help develop a comprehensive system of bicycle routes covering the entire city and connecting to many different destinations and points of interest. A map of proposed future routes can be found in Appendix D.

Goals and Objectives

The city envisions an intermodal transportation system that utilizes rail, auto, bus, pedestrian, and bicycling options. The city recognizes that to be competitive in the 21st century means attracting companies who have the luxury of locating in many different places and that part of attracting and retaining industry means having the amenities sought by modern companies, including the provision of multiple transportation options for the modern workforce. Other cities similar to New Haven in size and economy have

found that bicycle facilities help create a more livable city for residents and visitors. The following policy and objectives are intended to guide the city's approach to bicycling, in order to help reach a balanced transportation system.

Policy on Bicycle Transportation

Make the bicycle an integral part of daily life in New Haven, particularly for trips of less than five miles, by implementing a bikeway network, providing end-of-trip facilities, improving bicycle/transit integration, encouraging bicycle use, and making bicycling safer.

Objectives

- Complete a network of marked bikeways to serve bicyclists' needs, especially for travel to employment centers, schools, commercial districts, transit stations, institutions, and recreational destinations.

- Provide bikeway facilities that are appropriate to the street classifications, street widths, traffic volume and speed on all rights-of-way, by:

  - Creating street functional classifications to guide the city on the intended function of each street. Examples of classifications include Primary Arterial, Minor Arterial, and Collector. This bicycle plan urges the inclusion of Shared Roadway and Bicycle Lane as additional classifications.

  - Educating and promoting these new classifications as part of state and local transportation work projects. Improvements for one mode should not preclude future modifications to accommodate other modes nor encourage inappropriate use of a street.

  - Requiring new classifications, such as sidewalks or bicycle lanes, where appropriate, with local street reconstruction projects and resurfacing programs.

- Provide short and long-term bicycle parking in commercial and retail districts, in employment centers and multifamily developments, at schools and colleges, industrial developments, special events, recreational areas, and transit facilities such as rail stations and bus stops.

- Encourage mass transit providers to carry bikes and provide storage at stations.

- Engage in education and encouragement plans aimed at youth, adult cyclists, and motorists. Increase public awareness of the benefits of bicycling and of available resources and facilities.

- Encourage the reporting of road hazards.

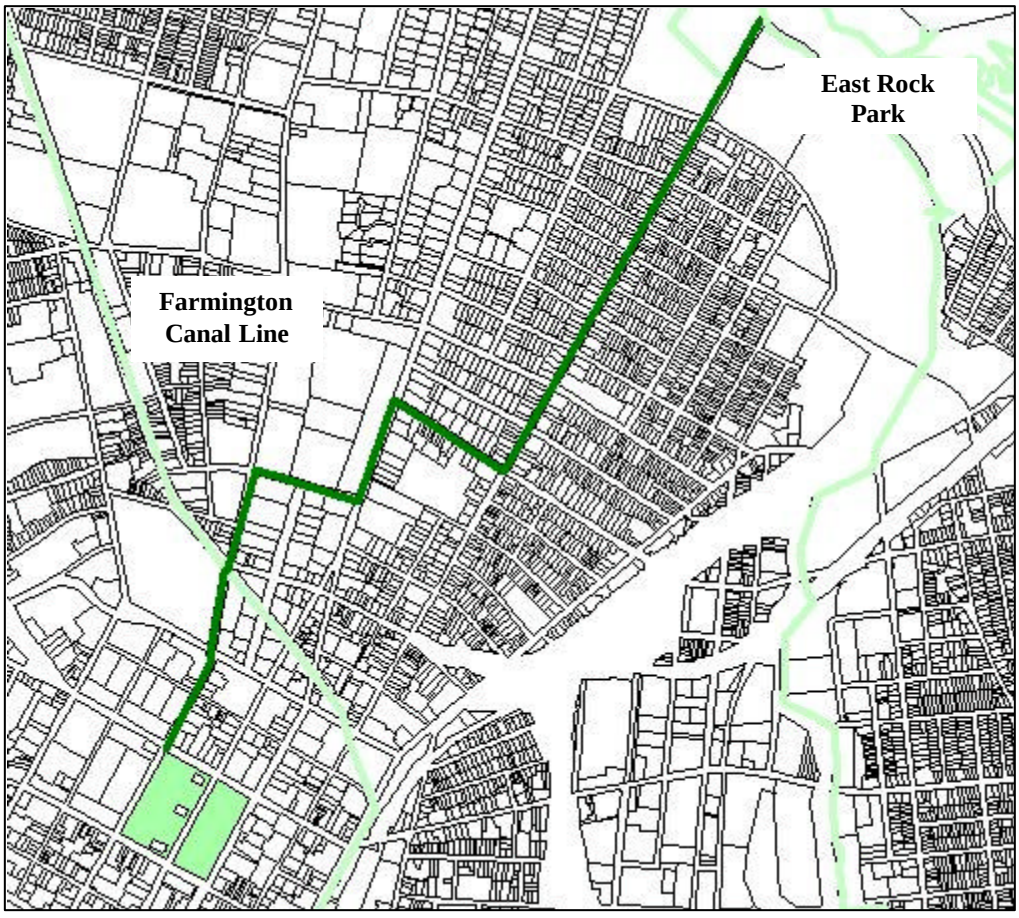
PART TWO:

RECOMMENDATIONS

1. Pilot Bicycle Route:

The Share the Streets Advisory Committee recognizes the need to implement the bicycle program on a timely and organized basis. The Committee further recognizes that it will take a period of time to implement a well-developed bicycle facilities plan and to develop many interconnecting routes across the city. Therefore, as a first step in fulfilling the larger goal of a comprehensive bicycle facility plan, the committee recommends that the initial bicycle route run between Orange Street at the base of East Rock Park to the New Haven Green and accommodate northbound and southbound bicycle traffic. This is a one-way distance of approximately 10,300 linear feet (just under two miles). See Figure 1 below:

Figure 1: Proposed Bicycle Route



For southbound trips, the proposed route starts at the northernmost part of Orange Street and heads south to Humphrey Street. Next it turns west on Humphrey to Whitney, then south on Whitney to Sachem. Then the route heads south again on Prospect Street. The route then crosses Grove Street and runs along College Street to the New Haven Green.

It is noted that bicyclists cut across a portion of the Yale Campus fronting Whitney Avenue. This route proposal does not include that deviation, but its inclusion in some future route should be considered if Yale and the City enter into discussion.

This route was devised over several committee meetings. It represents the most common and safest route bicyclists use to travel from the East Rock neighborhood to downtown destinations. This route uses a combination of arterial, collector and local streets. More detailed information such as street width and traffic counts can be seen in the appendix.

Recommended Facility Treatment:

The Committee recommends the following road treatments.

1. Bicycle Lane: This is the preferred treatment where travelway width allows for a separate Bike Lane. Motorized vehicles and bicycles travel along separate paths. Bike Route signs and pavement markings are placed along the Bike Route to clarify to motorists the existence of a dedicated bike lane.

   The Committee proposes a Bike Lane be installed from the Orange / Mitchell intersection to the Humphrey / Whitney intersection. In addition, the northbound segment of Prospect Street (between Sachem and Grove) is suitable for a delineated bike lane. This stretch of the proposed route measures 42 feet wide. The following cross section dimensions will accommodate a 42-foot wide road:

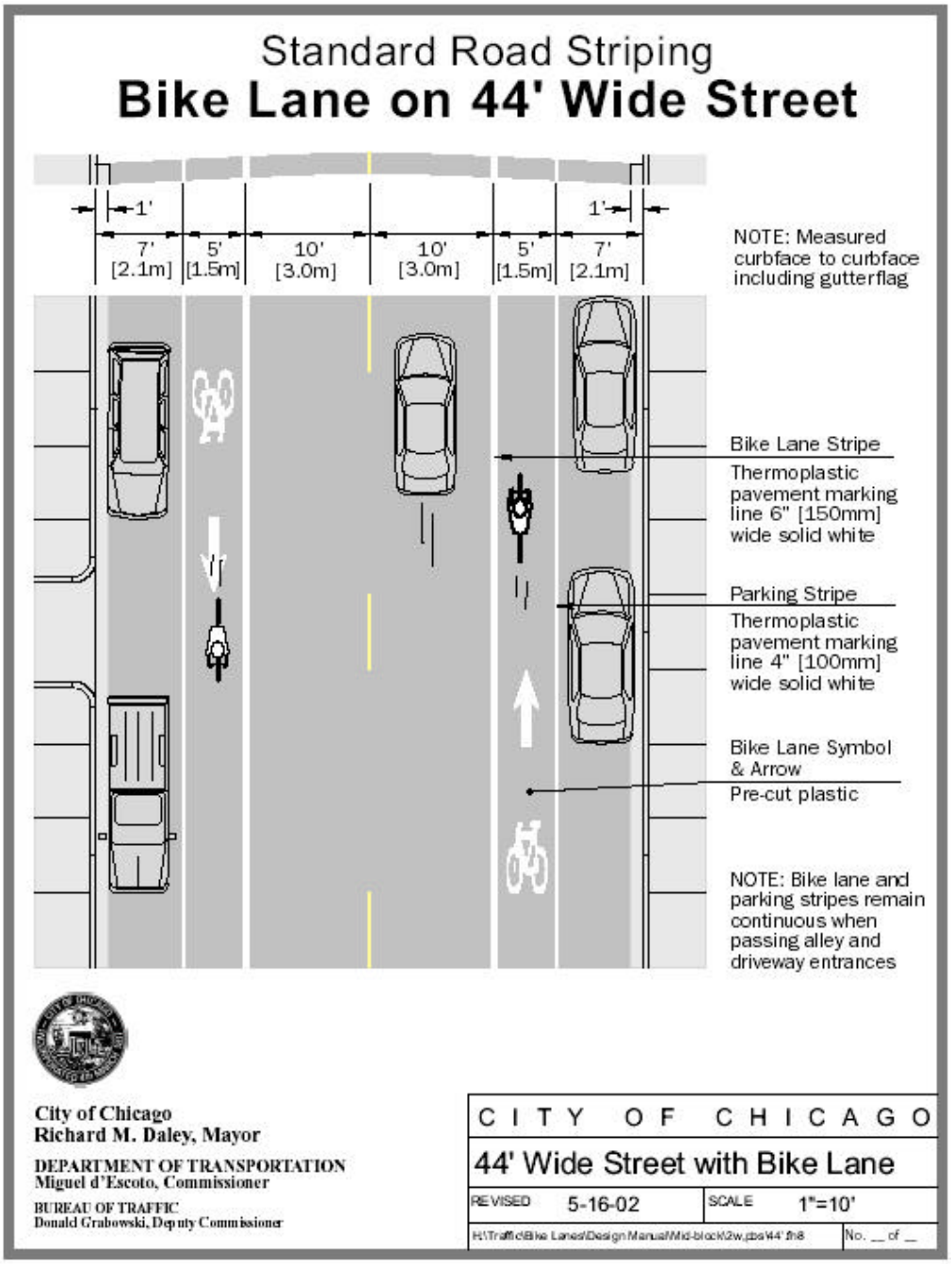
   - Parking lane: 7 feet (each side)
   - Bike Lane: 4 feet (each side)
   - Travelway width: 10 feet (each side)

The diagram on page 8 is used by the city of Chicago and shows a cross section for a 44-foot wide street. The committee recommends adjusting this cross section on 42-foot wide streets. This is accomplished by using a 4-foot Bike Lane instead of a 5-foot lane. A study titled “Bicycle Facilities Selection: A Comparison of Approaches”, authored by Michael King of the University of North Carolina at Chapel Hill defines bike lanes as being between 4 - 6 feet in width.

For the balance of the proposed route the committee recommends the following.

2. Shared Lane: This is the preferred treatment where travelway width is less than 42 feet and therefore does not allow for a separate Bike Lane. Vehicles and bicycles will share the same travelway much as they do now. Bike Route signs and pavement markings showing a bicycle minus the bike lane stripe, are placed along the route to clarify to motorists the shared status of the road.

Figure 2: Proposed Bike Lane Cross Section. The committee notes that by reducing the Bike Lane width from 5 feet to 4 feet, this cross section will work on a 42-foot wide street, such as Orange and Humphrey streets. On Prospect Street, part of the northbound segment is also suitable for a delineated lane.



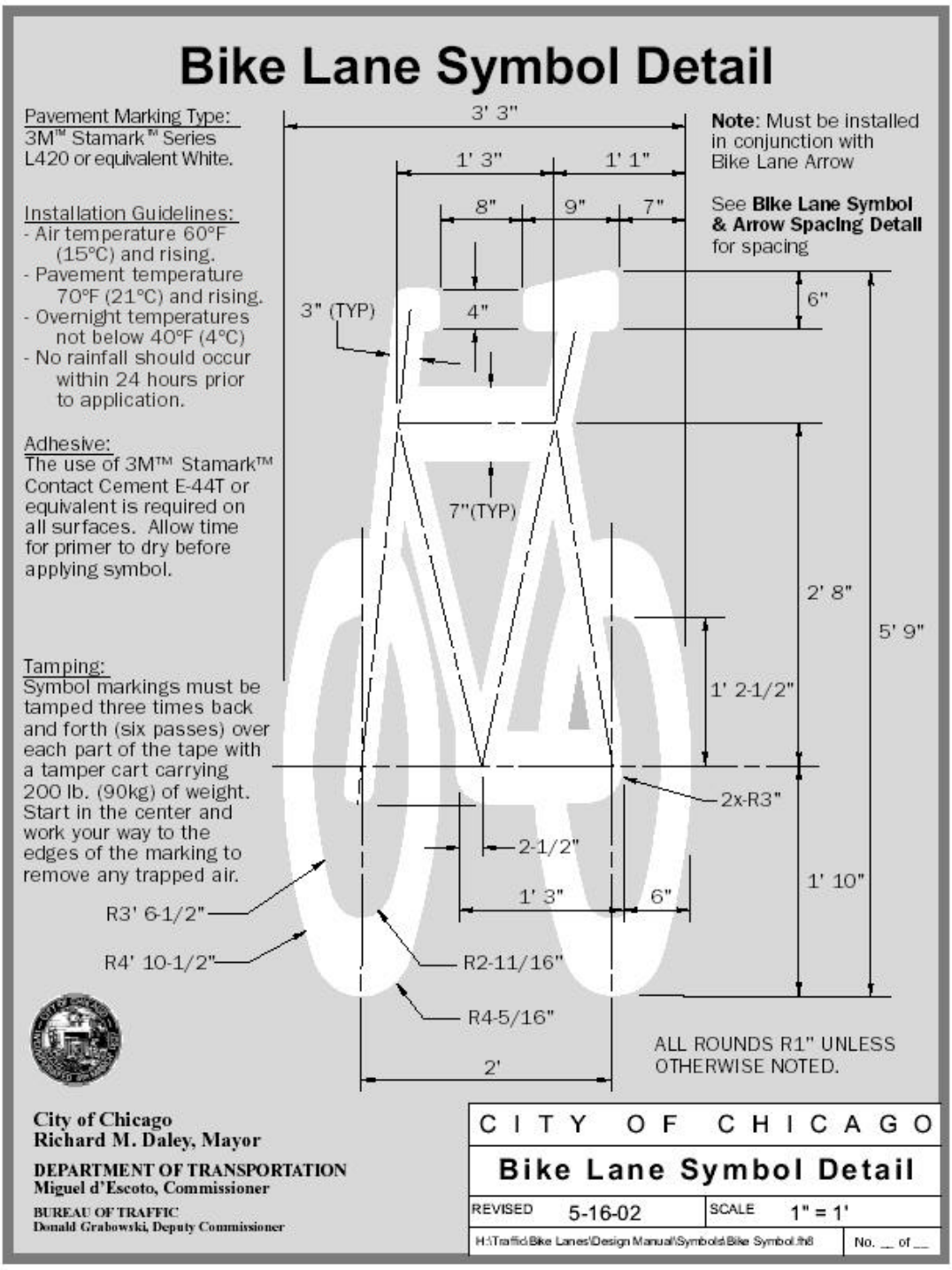
Estimated Costs:

- Cost estimate for Bike Lane / Shared Lane bicycle pavement symbol [$150 per symbol]: $ 4,800.
- Cost estimate for Bike Lane stripe [$0.80 per foot / 4,500 feet]: $ 3,600
- Cost estimate for Bike Route signage [$50 / sign, estimated at 30]: $ 1,500
- Cost estimate for sign posts and bolts: $ 500
- Cost estimate for labor: $ 825
- Bike racks and contingency: $3,775
- **Total Cost: Approximately $ 15,000.**

Figures 3 (below) and 4 (next page) show Bike Lane / Shared Lane symbols and signage.

Figure 3. Typical Bike Route Signage

Figure 5: Bicycle pavement symbol to be used on Bike Lanes and Shared Lane portions of the route.



Other Facility Improvements:

To improve the feasibility of bicycle transportation, the city is encouraged to install bicycle racks at train stations, city buildings and parks. A requirement for the provision of bicycle racks should also be incorporated into the site review of new building plans. Note that Union Station's bicycle rack is at capacity and that State Street Station has no bicycle facilities.

2. Long-Term Recommendations:

The long-term recommendations of this report will be addressed in the following four sections: Education, Encouragement, Engineering and Enforcement.

Comprehensive bicycle safety education requires a program designed for particular age groups: grade school, high school and adults as well as educational programs for commercial users such as bike messengers.

Education:

Existing educational programs within the schools, Parks Department, and Police Department should teach children and adults, cyclists and motorists, to safely share roads and trails. The Connecticut Department of Transportation and the Connecticut Bicycle Coalition should work to provide additional education.

Encouragement:

A City Bicycle Map and Safety Brochure should be developed, widely distributed and regularly updated. It will include information about safety helmets, traffic rules for bicyclists and strategies to minimize bike theft, as well as information about bicycle routes around New Haven.

The Connecticut Department of Transportation should be informed of New Haven's bicycling routes for inclusion on their Connecticut Bicycle Map, to help bicyclists from surrounding towns reach New Haven. New Haven's Festival of Arts and Ideas, along with the Connecticut Bicycle Coalition, may develop an annual Bicycle Week to further encourage bicycling in New Haven. The Parks Department may occasionally close park roads to vehicular traffic, to further encourage alternative forms of transportation.

Enforcement:

The City should develop a Bicycle Facility Maintenance Request Program to systematically respond to requests for small-scale, low-cost improvements such as sweeping, repairing surface problems, improving lighting, and replacing unsafe gratings. Bicyclists will make requests by phoning or emailing the Traffic and Parking Department or mailing in a Request Card. Cards should be made available at area bike shops, through

interest groups, and at the Traffic and Parking Department. Staff will catalogue all requests and route them to the appropriate department. Requests outside the city's jurisdiction will be sent to the appropriate jurisdiction, while requests within the city will be considered for the capital improvement program or other funding sources. The person making the request will be contacted by letter or telephone once action is taken.

The Police Department may identify the most significant bicycle safety problems and develop a selective enforcement program to reduce accidents.

Engineering:

The Mayor's Share the Streets Advisory Committee will continue to meet to develop a network of bicycle routes around New Haven, to create connectivity for bicyclists and pedestrians moving between New Haven's neighborhoods, parks, schools and downtown. The city should:

- Adopt engineering standards for street and road design that mandate consideration of bicycles in new roadway construction and roadway improvement projects, such as projects tentatively planned for Whalley Ave and Rte. 34.

- Develop safe on-road routes connecting Fair Haven to Downtown, Westville through Dixwell to Downtown, the train station to Downtown, and the Hill through the hospital neighborhood to downtown. Phase in at least one bike lane or shared-use lane each year until this network is completed.

- Expand existing bike paths along the waterfront and the Farmington Canal and develop signed routes to connect these paths to on-road routes.

- Improve intersections hazardous to pedestrians and cyclists.

- Develop a means of measuring bicycle use city-wide.

Implementation Strategies:

To implement both the short- and long-term recommendations of the Share the Streets initiative, the following strategies are recommended:

- Continue the Mayor's Share the Streets Advisory Committee for the following purposes:
    - To oversee the incorporation of the Share the Streets initiative into the City's Plan of Development and Conservation.
    - To work with city departments to develop engineering standards for street and roadway designs that accommodate bicycles.
    - To coordinate roadway projects and project planning to insure appropriate bicycling accommodations.
    - To advocate the incorporation of bicycling appropriate accommodations in all development plans.
    - To advise the Mayor on actions in these areas as well as other measures which will make New Haven a bicycle-friendly city.
    - To develop an annual work plan and report progress on the prior year's plan.
- Review and advance the recommendations of residents and facility users. A small canvass of users revealed a number of small, often maintenance related issues, as shown in Appendix D.

References:

The following sources were reviewed in preparing this report. In the course of reviewing information it was found that a single set of standards used by transportation and planning officials does not exist. A report entitled “Bicycle Facility Selection: A Comparison of Approaches” prepared by Michael King for the Pedestrian and Bicycle Information Center, and the Highway Safety Research Center of the University of North Carolina, Chapel Hill bears this out.

The bulk of the material in the Model Bicycle Facilities Plan comes from the Portland, Oregon Department of Transportation’s Bicycle Facilities Master Plan. Portland has long been at the forefront of urban planning in the United States and has served as a benchmark for other communities.

- City of Portland Oregon: Bicycle Master Plan
- City of Chicago, Illinois: Bicycle Master Plan
- American Association of State Highway and Transportation Officials (AASHTO).
- The Connecticut Bike Coalition
- Manual on Uniform Traffic Control Devices
- Association of Pedestrian and Bicycle Professionals
- Pedestrian and Bicycle Information Center. <bicyclinginfo.org>
- Federal Highway Administration
- Bicycle Facility Selection: A Comparison of Approaches
- New Haven Department of Traffic and Parking
- New Jersey Department of Transportation

APPENDIX A:

Model Bicycle Facilities Plan

The following plan is offered as a model the City can use to develop it's own Bicycle Facilities Plan tailored to local conditions and needs. Many different sources were reviewed in formulating this model, with the Bicycle Facilities Master Plan of Portland, Oregon making up the bulk of the model. A full Bicycle Facilities Master Plan for New Haven should follow this interim report and be referenced in the City's Plan of Conservation and Development.

Bikeways

Planning Factors:

A bicycle route is a system of on street facilities such as shared roadways, wide curb lanes, bicycle lanes and/or separate multi-use paths that allow a rider to go from point A to point B. The location and type of bicycle route is dependant on factors such as accessibility, safety and the riding environment.

Bicycle routes should be located where their use can be maximized. Factors that should be considered are the routes' ability to serve employment centers, commercial areas, shopping centers, education facilities, and parks and recreation areas. The location of bicycle routes should provide for adequate access points, and provide a route that connects origin and destination points in a direct manner.

Bicycle facility types should be selected in a manner whereby conflicts with motorists and pedestrians are minimized. They should also provide a riding environment that is aesthetically pleasing and conducive to the physical ability of the average cyclist. One important consideration in selecting the type of facility is continuity. If a route type change is necessary, the transitions from one type of facility to another must be well marked. Selection of the appropriate facility type to meet the bicyclists needs is dependent on many factors. The following paragraphs describe the most common uses for each facility type.

Type of Bicycle Facilities

Bicycles are legally classified as vehicles and can, and will, be ridden on most public roadways with the exception of limited access highways. All streets should be accessible by bicycle, with the appropriate bicycle facility depending on motor vehicle traffic-speed and volume, as well as on the functional classification.

There are three basic types of bikeway: Off-Street Path; Bicycle Lane; and Shared Roadway.

Off-Street Path

An off-street path (also called a multi-use path) is a facility separated from motor vehicle traffic by an open space or barrier, either within the roadway right-of-way or within an independent right-of-way. Off-street paths are typically used by pedestrians, joggers, skaters, and bicyclists as two-way facilities. Off-street paths may be appropriate in corridors not well served by the street system (if there are few intersecting roadways), to create short cuts that link urban destination and origin points, along continuous greenbelts such as rivers and waterfront areas, abandoned rail corridors, and as elements of a community recreational trail plan.

Bicycle Lane

A bicycle lane is a portion of the roadway designated for exclusive or preferential use by bicyclists in urban areas. Bicycle lanes are appropriate on most urban arterials and collector streets if road width is sufficient. Bicycle lanes must always be well marked to call attention to their preferential use by bicyclists.

Shared Roadway

On a shared roadway, bicyclists and motorists share the same travel lanes. A motor vehicle driver may have to cross over into the adjacent travel lane to pass a bicyclist, unless a wide outside lane is provided. Shared roadways are adequate for neighborhood streets with low traffic volumes and may be adequate for collectors and minor arterials if road width and traffic volumes allow.

There are two variations of the shared roadway concept. Those with wide outside lanes, and those with normal lane widths.

Wide Curb Lane or Shared Lane

On streets with higher volumes and speeds where bicycle lanes are warranted but can not be provided due to physical constraints, a wide outside lane may be provided to accommodate bicycle travel. A wide outside lane should be wide enough to allow an average size motor vehicle to pass a bicyclist without crossing over into the adjacent lane.

On neighborhood streets with low traffic volumes and speeds, wide outside lanes are not necessary for safe conduct of bicycle traffic.

Guidelines for Selecting Bikeway Facilities for All New or Reconstructed Streets.

All streets except limited access highways should be accessible by bicycle. Whenever streets are constructed or reconstructed, appropriate bikeway facilities must be included to accommodate bicyclists' needs. The guidelines in Table 1 should be used to determine the appropriate treatment for all new or reconstructed streets. In general, the appropriate treatment for local streets with fewer than 3,000 motor vehicles per day, and not designated as bikeways, is the street as is (shared roadway); no special bicycle facility is necessary, although traffic calming maybe necessary if volumes or speeds increase to an unacceptable level.

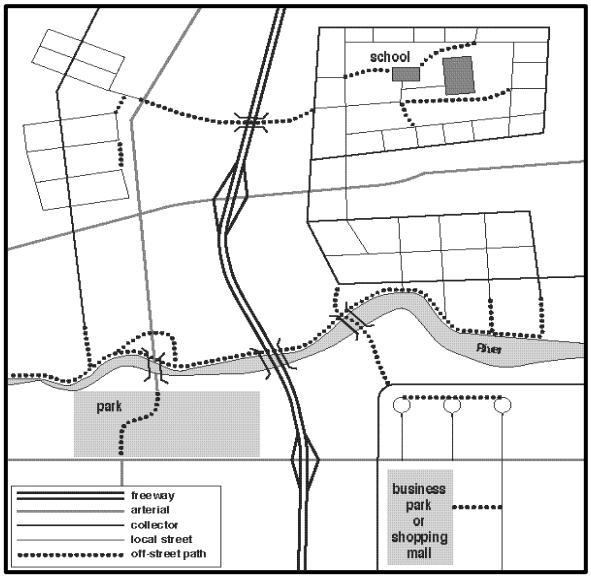
For streets with more than 3,000 vehicles per day, the preferred treatment is bicycle lanes. Where bicycle lanes cannot be included the alternative treatments are traffic calming or wider than normal outside lanes. Whenever a road is constructed or reconstructed, staff from the department managing the project should determine the appropriate bikeway facility to be installed.

General Design Practices

Off-Street Paths:

Off-street paths can provide a good facility, particularly for novice riders, recreational trips, and cyclists of all skill levels preferring separation from traffic. Where these paths cross private property, easements will be required.

Figure 1. Appropriate Use of Off-Street Path

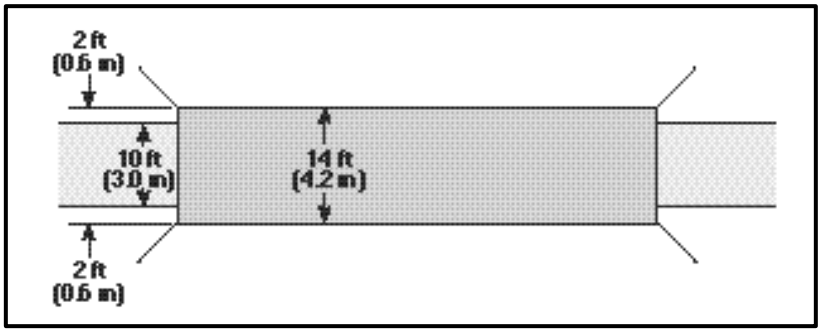


However, if poorly designed, they can be, at best, a poor investment of public dollars, and at worst, dangerous. Some of the advantageous practices in off-street path design include:

- Implementing frequent access points from the local road network; if access points are spaced too far apart, users will have to travel out of direction to enter or exit the path, which will discourage use;
- Placing directional signs to direct users to and from the path;

- Building to a standard high enough to allow heavy maintenance equipment to use the path without causing it to deteriorate;
- Limiting the number of at-grade crossings with streets or driveways;
- Terminating the path where it is easily accessible to and from the street system; preferably at a controlled intersection or at the beginning of a dead-end street. Poorly designed paths can put pedestrians and cyclists in a position where motor vehicle drivers do not expect them when the path joins the street system.
- Addressing potential security problems up front.

Figure 2. Off-Street Path Width (Such as the Farmington Canal Greenway)



Ten (10) feet is the standard width for a two-way off-street path (Figure 2). The path should be 12 feet wide in areas with high use by bicyclists, pedestrians, and joggers. The minimum width is 8 feet, but is not recommended in most situations because they often become overcrowded.

Bicycle Lane Design

Bicycle lanes are one-way facilities that carry bicycle traffic in the same direction as adjacent motor vehicle traffic. Bicycle lanes are the preferred facility for urban arterial and collector streets.

Bicycle lanes are created by the addition of a 6-inch stripe and stencils. Motorists are prohibited from using bicycle lanes for driving and parking. This does not preclude motor vehicles from using a bicycle lane for emergencies or breakdowns.

Bicycle Lanes on One-Way Streets:

Bicycle lanes on one-way streets should be on the right side of the road way, except where a bicycle lane on the left will decrease the number of conflicts (e.g., those caused by heavy bus traffic or dual right-turn lanes, etc.). Directional arrow pavement markings should be used to indicate the proper direction of travel and discourage wrong way riding.

Shared Roadway:

There are no specific bicycle standards or treatments for low-volume, low-speed shared roadways; they are simply the roads as constructed. Shared roadways function well on roads such as local streets and minor collectors with speed limits of 25 mph, or traffic volumes of 3,000 average daily traffic (ADT) or less.

Many urban local streets are carrying greater traffic volumes and at higher speeds than their designation should normally allow. These could function well as shared roadways if excessive traffic speeds and volumes were effectively reduced through traffic calming techniques, such as curb extensions, speed bumps, roundabouts and the like.

Wide Outside Lane:

For higher volume/higher speed streets (above 25 mph or 3,000 ADT) where there is inadequate width to provide the required bicycle lanes or shoulder bikeways, a wide outside lane may be provided that accommodates both cyclists and motor vehicles. This could occur on retrofit projects where there are severe physical constraints, and all other options have been pursued, such as narrowing travel lanes to minimum acceptable widths.

A wide outside lane is typically 14 feet wide. Usable width is normally measured from curb face to the center of the lane stripe, but adjustments need to be made for drainage grates, parking, and longitudinal ridges between pavement and gutter sections. For widths of 15 feet or greater, a bicycle lane or shoulder bikeway should be striped.

Signed Bikeway Connection

For shared roadways that act as connections between bikeways and/or major destinations, a "Bicycle Route" sign with directional information should be provided.

Intersection Design

Intersections are areas where most conflicts between various roadway users occur. By their very nature, intersections put one group of travelers in the path of others. Good intersection design creates a situation where those approaching the intersection have a clear indication what path they must follow and who has the right-of-way. As with other roadway design features, bicyclists must be treated as vehicles: only in extremely rare cases should they be encouraged to proceed through intersections as pedestrians.

Basic Principles

Some basic principles to be followed when designing intersections are:

- Unusual conflicts should be avoided.
- Intersection design should create a path for bicyclists that is direct, logical and as close to the path of motor vehicle traffic as possible.
- Bicyclists following the intended trajectory should be visible and their movements should be predictable.
- Potential safety problems associated with the difference between auto and bicycle speeds should be minimized.

Simple Right Angle Intersections

Simple right angle intersections are usually the simplest to treat for bicycle movement. Bicyclists must be allowed to follow a path that is as direct as possible, using the following techniques:

- Bicycle lanes should be striped to a marked or unmarked crosswalk.
- The bicycle lane stripe should be a solid stripe all the way to the crosswalk.
- The lanes should resume at the other side of the intersection.

Complicated Intersections:

For an already existing complicated intersection, or if a complex intersection is absolutely needed, bicycle lanes may be striped with dashes to guide bicyclists through a long undefined area.

Right Turn Lanes:

Right-turn lanes present special problems for cyclists because right-turning cars and through bicyclists must cross paths. To alleviate these concerns, the design in Figure 6 below should be used for bicycle lanes. The paths of the through bicyclist and the right-turning motor vehicle should cross prior to the intersection. This configuration has three advantages:

- It allows this conflict to occur away from the intersection where other conflicts could occur.

- The difference in travel speeds is an advantage, as a motor vehicle driver can pass a bicyclist rather than ride side-by-side.

- All users are encouraged to follow the rules of the road: through vehicles (including bicyclists) proceed to the left of right-turning vehicles.

Contra-Flow Bicycle Lanes:

Contra-flow bicycle lanes on a one-way street are not recommended. However, in order to devise a rational bicycle route system in New Haven, contra-flow bicycle routes may be necessary in a limited format. For those special circumstances under which this design may be necessary, the following conditions for inclusion in the design are suggested:

- The contra-flow bicycle lane provides a substantial savings in out-of-direction travel compared to the route motor vehicles must follow;

- The contra-flow bicycle lane is short and provides direct access to a high-use destination point;

- Safety is improved because of reduced conflicts;

- There are no or very few intersecting driveways, alleys or streets on the side of the proposed contra-flow lane;

- Bicyclists can safely and conveniently reenter the traffic stream at either end of the section;

- A substantial number of cyclists are already using the street; and

- There is sufficient street width to accommodate a full-dimension bicycle lane.

A contra-flow bicycle lane may also be appropriate on a one-way street recently converted from a two-way street (especially where this change occurred to reduce motor vehicle traffic through neighborhoods).

For a contra-flow bicycle lane to function well, these special features must be incorporated into the design:

- The contra-flow bicycle lane must be placed on the right side of the street (to drivers' left) and must be separated from oncoming traffic by a double yellow line. This indicates that the bicyclists are riding on the street legally, in a dedicated travel lane.

- Any intersecting alleys, major driveways and streets must have signs indicating to motorists that they should expect two-way bicycle traffic.

- Existing traffic signals must be fitted with special signals for bicyclists, with loop detectors or push-buttons. The push-buttons must be placed so they can be easily reached by bicyclists, without having to dismount.

- It is preferable to place a separate bicycle lane in the direction of motor vehicle traffic, striped as a normal bicycle lane. Where the roadway width does not allow this, bicyclists will have to share the road with traffic. In this situation, striping the contra-flow bicycle lane should take precedence, otherwise some cyclists will be tempted to ride illegally against traffic.

Bikeway Signing

Basic Principles

Well-designed roads usually require very little signing, because they are built so all users understand how to proceed. Conversely, an overabundance of warning and regulatory signs may indicate a failure to have addressed problems. The attention of drivers, bicyclists and pedestrians should be on the road and other users, not on signs along the side of the road.

Over-signing of roadways is ineffective and can degrade their usefulness to users. Too many signs are distracting and a visual blight, they create a cluttered effect and waste resources.

The message conveyed by the sign should be easily understandable by all roadway users. The use of symbols is preferred over the use of text.

Off-street Paths:

Off-street paths should be signed with appropriate regulatory, warning and destination signs. A center solid line (yellow) is recommended as well.

Bicycle Lane Designation:

Bicycle Lanes should be designated with the following markings:

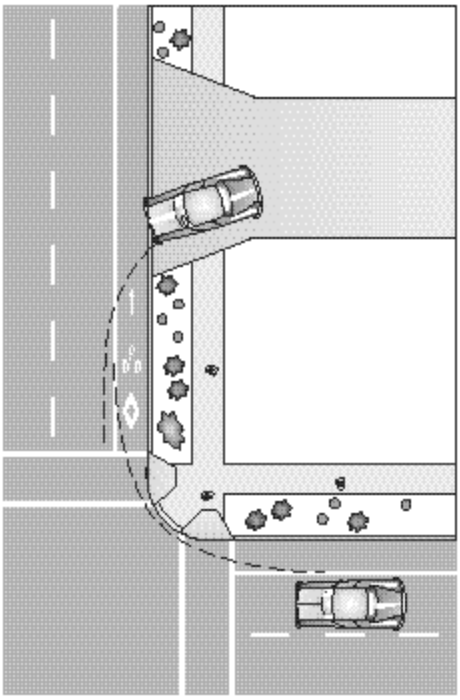
An 8-inch, white stripe (bicycle lane measurements are taken from the center of the stripe). Bicycle stencil, directional arrow, and diamond spaced every 1000 feet or after every major intersection, with three diamonds in between.

Marking Placement

Markings should be of cold plastic material. They should be placed after most intersections to alert drivers and bicyclists entering the roadway to the exclusive nature of the bicycle lanes. Markings should be placed approximately 1000 feet apart, with three symbols in between each bicycle/arrow/diamond stencil. Markings should be placed after every intersection where a parking lane is placed between the bicycle lane and the curb. Care must be taken to avoid placing markings in an area where motor vehicles are expected to cross a bicycle lane (Figure 7). This includes driveways and the area immediately after an intersection.

Figure 7. Bike Lane Stencil Placed out of Swept Path of Turning Vehicles

(Portland, Oregon DOT)



Intersections

Bicycle lanes should normally be striped to a marked crosswalk or to a point where turning vehicles would cross them. At intersections with a high volume of right-turning traffic, it may be advisable to skip striping the bicycle lane for 50 feet preceding the intersection. The lanes should resume at the other side of the intersection. Bicycle lanes are not normally striped through intersections except in the case of skewed or complex intersections.

Right Turn Lanes at Intersections

The short through bicycle lane segment should be striped with two 8" stripes to the left of right-turn lane and connected to the preceding bicycle lane with dashed lines, using 8" X 36" segments on 15 foot centers. The dashed line should be cold plastic material. A marking should be placed at the beginning of the through bicycle lane. A sign stating BEGIN RIGHT TURN LANE, YIELD TO BIKES, should be placed at the beginning of the taper.

Outer Edge of Bicycle Lane

If parking is allowed next to a bicycle lane, the parking area should be defined by parking space markings or a solid 4-inch stripe.

Shared Roadways

In general, no signs are required for a shared roadway not on the city's bikeway network. Bicyclists should be expected on all urban local streets, which are mostly shared roadways. On narrow roads heavily used by cyclists, it may be helpful to install bicycle-warning signs with a RIDER ON ROADWAY sign. These signs should be used where there is insufficient shoulder width for a significant distance. This signing should be in advance of the roadway condition. If the roadway condition is continuous, an additional rider "NEXT XX MILES" may be used.

Directional and Destination Signs

Directional "Bicycle Route" signs should be used on shared roadways to direct bicyclists from one bikeway to another where the bikeway is not continuous, or between a bikeway and a destination. Additional directional information to assist bikers with connections should be considered.

Placement of Signs

Because of cyclists' and pedestrians' lower line of sight, on off-street paths the bottom of signs should be about 5 feet above the path. If a secondary sign is mounted below another sign, it should be a minimum of 4 feet above the path. The signs should have sufficient lateral clearance from the edge of the path. Signing for on-street bikeways should conform to City standards.

Maintenance

A bicyclist is riding on two very narrow, high-pressure tires. What may appear to be an adequate roadway surface for automobiles (with four wide, low-pressure tires) can be treacherous for cyclists. Fairly small rocks can deflect a bicycle wheel, a minor ridge in the pavement can cause a spill, a pot-hole can cause a wheel rim to bend. Wet leaves are slippery and can cause a bicyclist to fall. The gravel that gets blown off the travel lane by traffic accumulates against the curb, in the area where bicyclists are riding. Thus, it is important to properly maintain existing facilities. Bikeways will always be subject to debris accumulation and surface deterioration.

Adequate maintenance will help to protect the investment of public funds in bikeways, so they can continue to be used safely. Poorly maintained facilities will become unusable and they may become a legal liability. Cyclists who continue to use them may risk equipment damage and injury. Others will choose not to use the facility at all.

Routine Maintenance

Sweeping:

Each year, the Share the Streets Committee should provide a list of high priority streets to the Department of Traffic and Parking. This list will be used in planning resource allocations for street cleaning for routine service.

Surface Repairs:

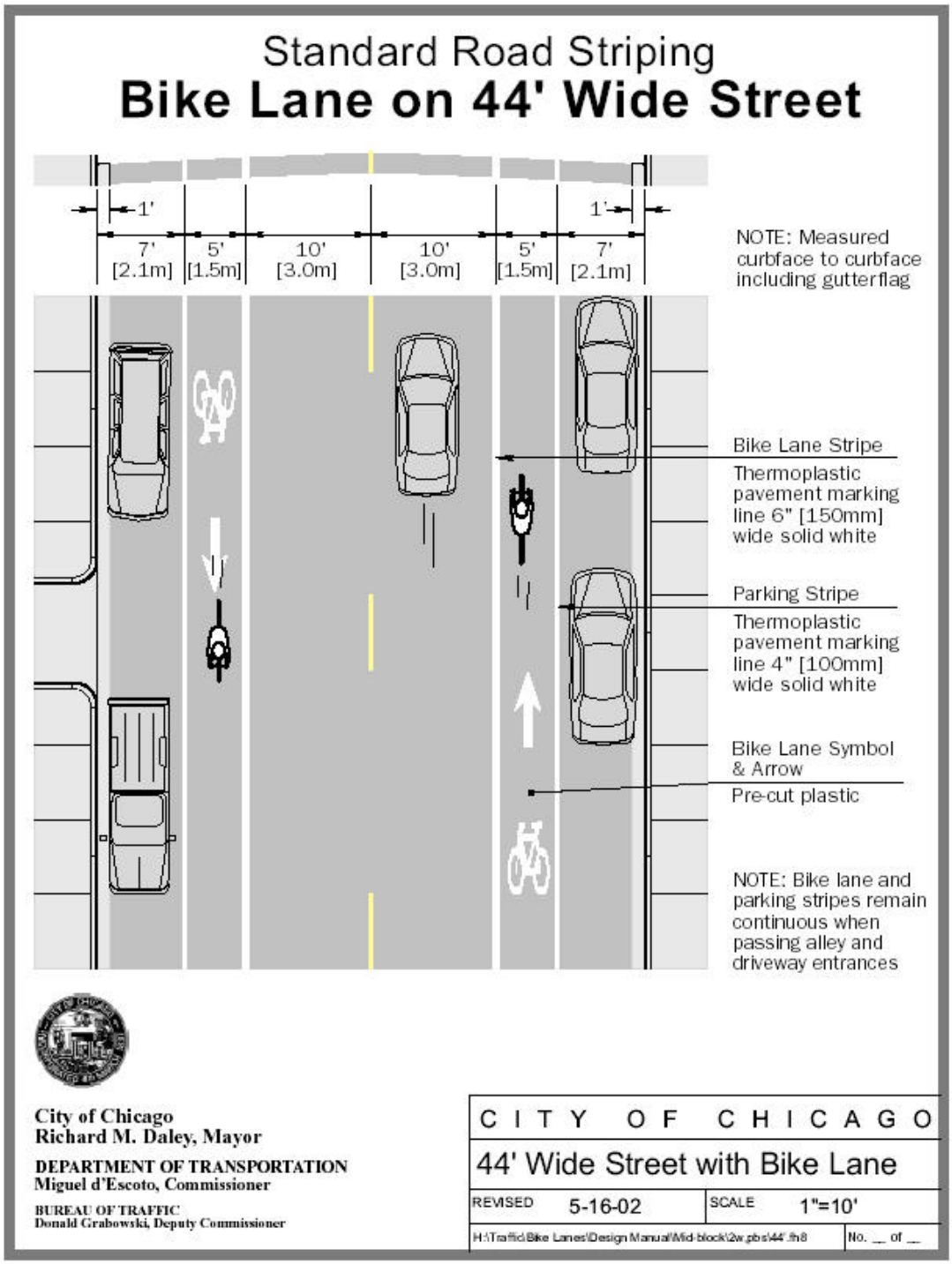
A smooth surface, free of potholes and other major surface irregularities, should be provided and maintained. Care should be taken to eliminate other physical problems. Requests for surface improvements should be made to the Department of Traffic and Parking by the Share the Streets Committee.

Signage and Drainage:

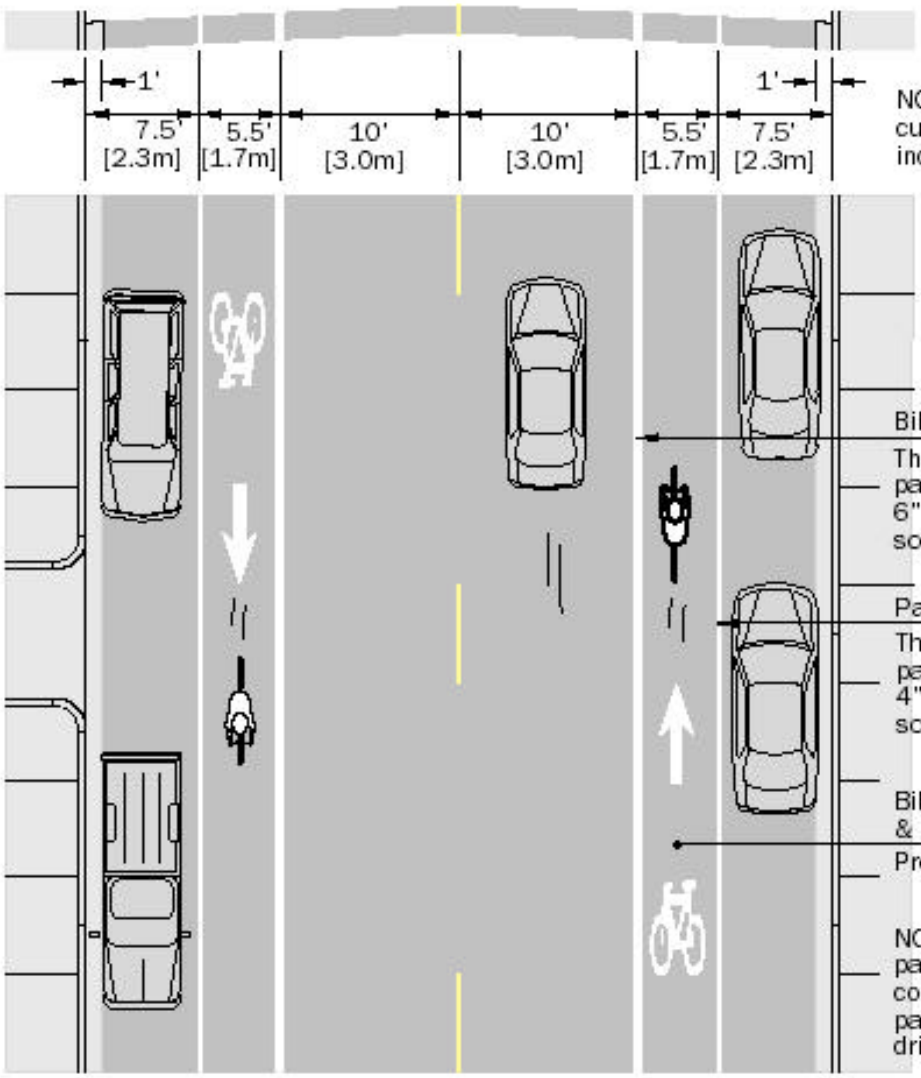
It is very important that bikeway signs, striping, and legends be kept in a readable condition. Though drainage facilities are usually well designed and constructed when new, they do change grades and deteriorate over time. It is often necessary to adjust or replace catch basins to improve drainage. A bicycle-safe drainage-grate at the proper height greatly improves bicycle safety. Sometimes small asphalt dams are constructed on highway shoulders to divert storm water into catch basins. These can be a hazard to cyclists.

APPENDIX B:

The City of Chicago, has developed bicycle lane roadway treatments based upon AASHTO, MUTCD, and other recognized organizations. The following illustrations are examples of Chicago's efforts. The Committee recommends the Chicago standards be studied for use in New Haven



Standard Road Striping
Bike Lane on 46' Wide Street



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DEPARTMENT OF TRANSPORTATION
Miguel d'Escoto, Commissioner

BUREAU OF TRAFFIC
Donald Grabowski, Deputy Commissioner

CITY OF CHICAGO		
46' Wide Street with Bike Lane		
REVISED 5-16-02	SCALE 1"=10'	
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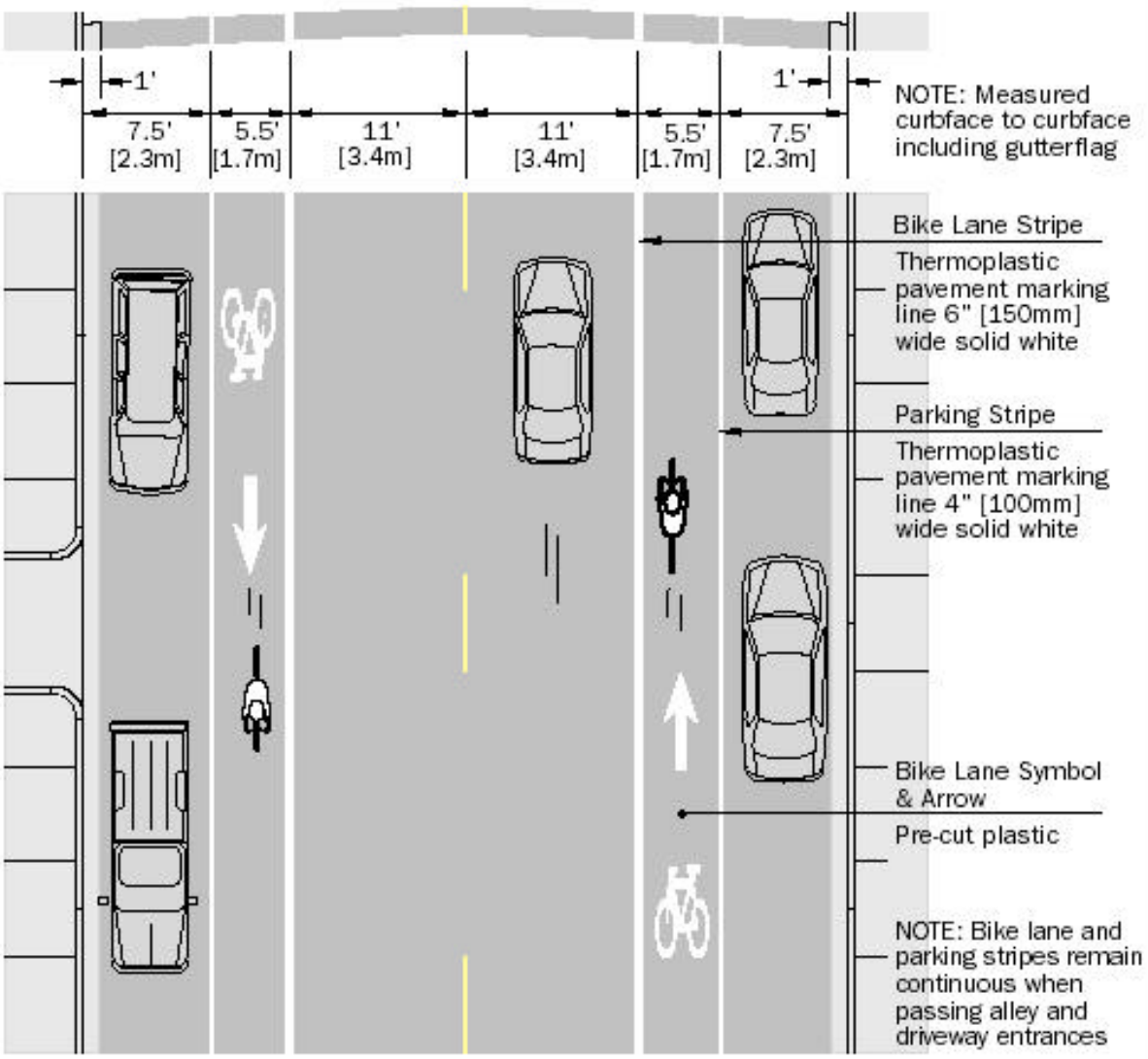
Standard Road Striping
Bike Lane on 48' Wide Street



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Miguel d'Escoto, Commissioner

BUREAU OF TRAFFIC
Donald Grabowski, Deputy Commissioner

CITY OF CHICAGO		
48' Wide Street with Bike Lane		
REVISED 5-16-02	SCALE 1"=10'	
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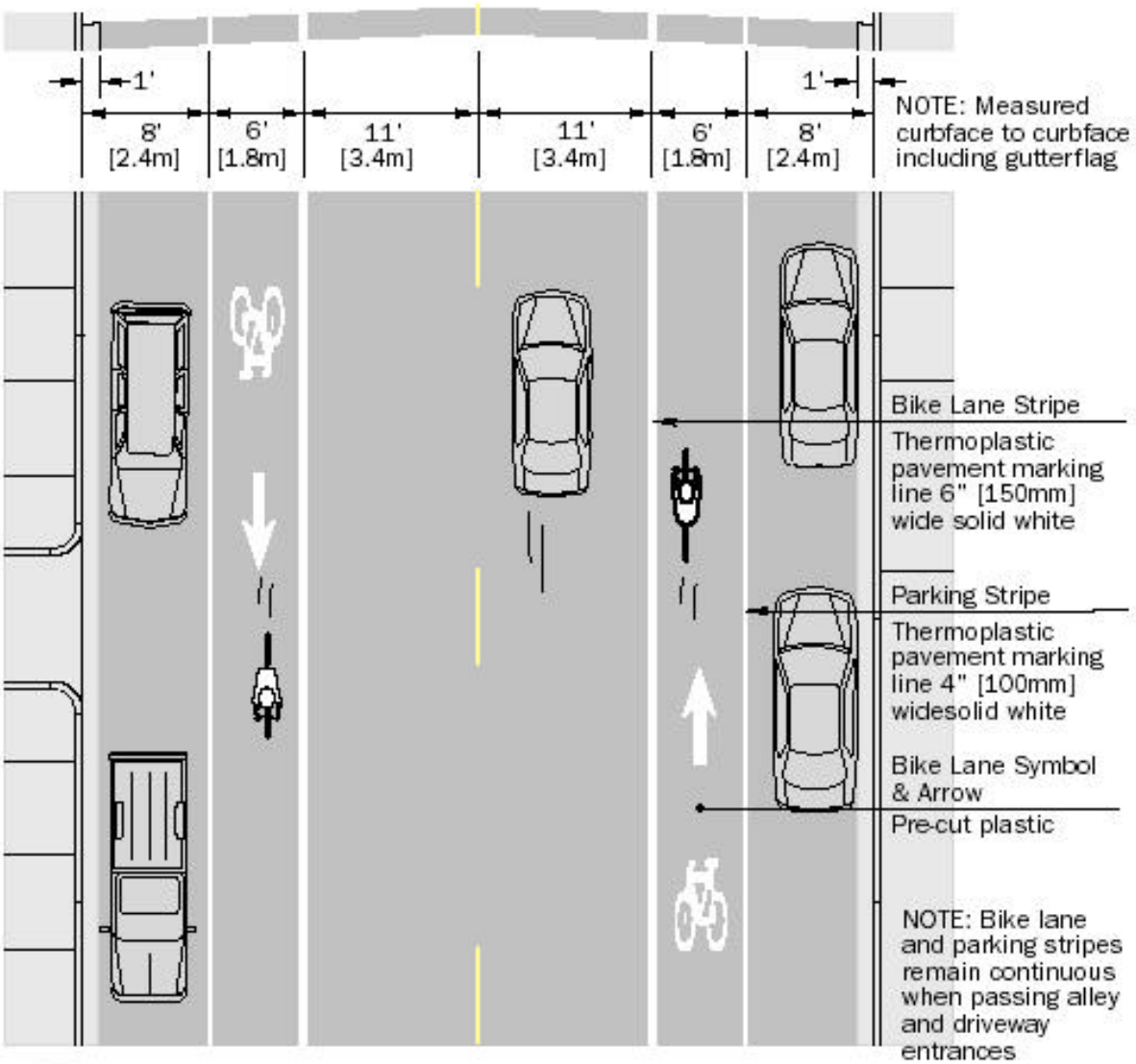
Standard Road Striping
Bike Lane on 50' Wide Street



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CITY OF CHICAGO	
50' Wide Street with Bike Lane	
REVISED 5-16-02	SCALE 1"=10'
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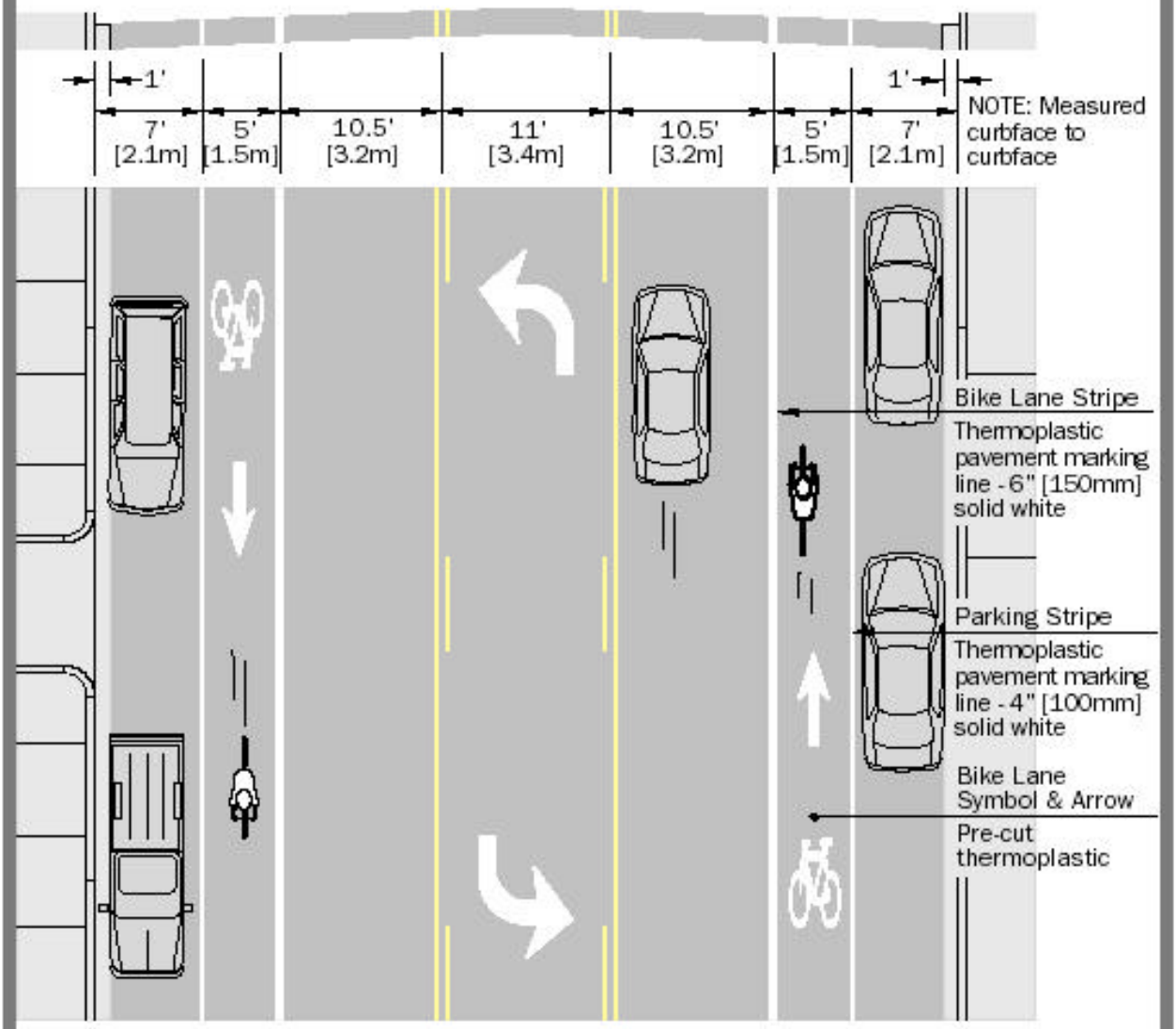
Bike Lane on 55' Wide Street
With Parking on Both Sides



NOTE: Bike lane and parking stripes remain continuous when passing alley and driveway entrances

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CITY OF CHICAGO	
55' [16.7m] Street with Bike Lane	
REVISED 5-16-02	SCALE 1"=10'
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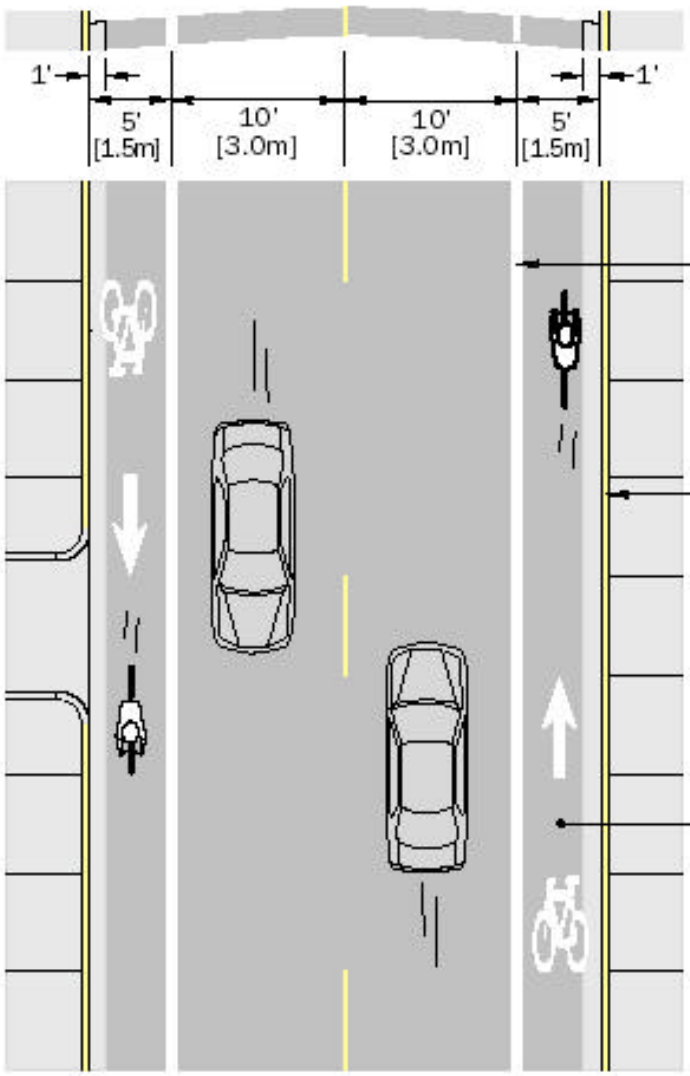
Bike Lane on 2-way Street
With No Parking on Both Sides



NOTE: Measured curbface to curbface.

Bike Lane Stripe
Thermoplastic pavement marking line
8" [200mm] wide
solid white

No Parking Stripe
Pre-formed Inlay Tape marking line
4" [100mm] wide
solid yellow

NOTE: Apply to top of curb

Bike Lane Symbol & Arrow
Pre-cut plastic

NOTE: Bike lane and parking stripes remain continuous when passing alley and driveway entrances.

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CITY OF CHICAGO			
Bike Lane with No Parking			
REVISED	5-16-02	SCALE	1"=30'
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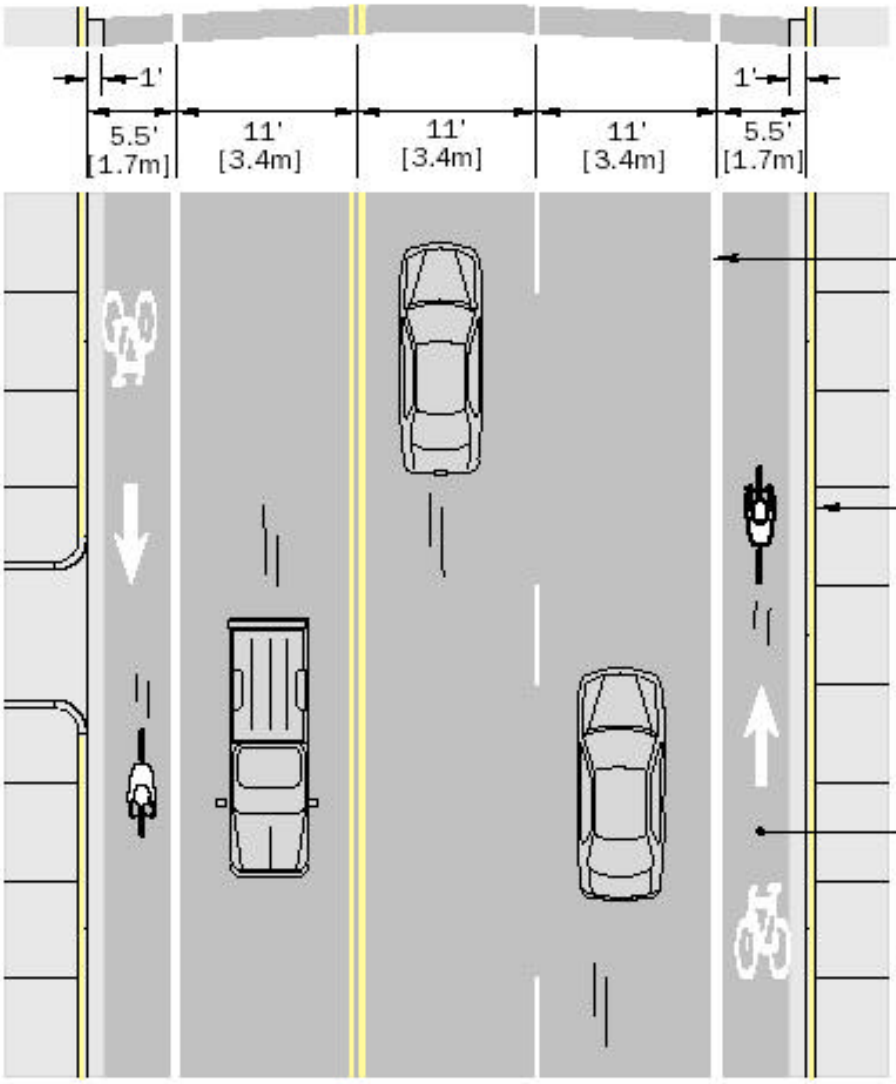
Bike Lane on 44' Wide Street
No Parking on Both Sides



NOTE: Measured curbface to curbface

Bike Lane Stripe
Thermoplastic pavement marking line 8" [200mm] wide solid white

No Parking Stripe
Pre-formed Inlay Tape marking line 4" [100mm] wide solid yellow

NOTE: Apply to top of curb

Bike Lane Symbol & Arrow
Pre-cut plastic

NOTE: Bike lane and parking stripes remain continuous when passing alley and driveway entrances

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CITY OF CHICAGO		
44' Wide Street with Bike Lane		
REVISED 5-16-02	SCALE 1"=10'	
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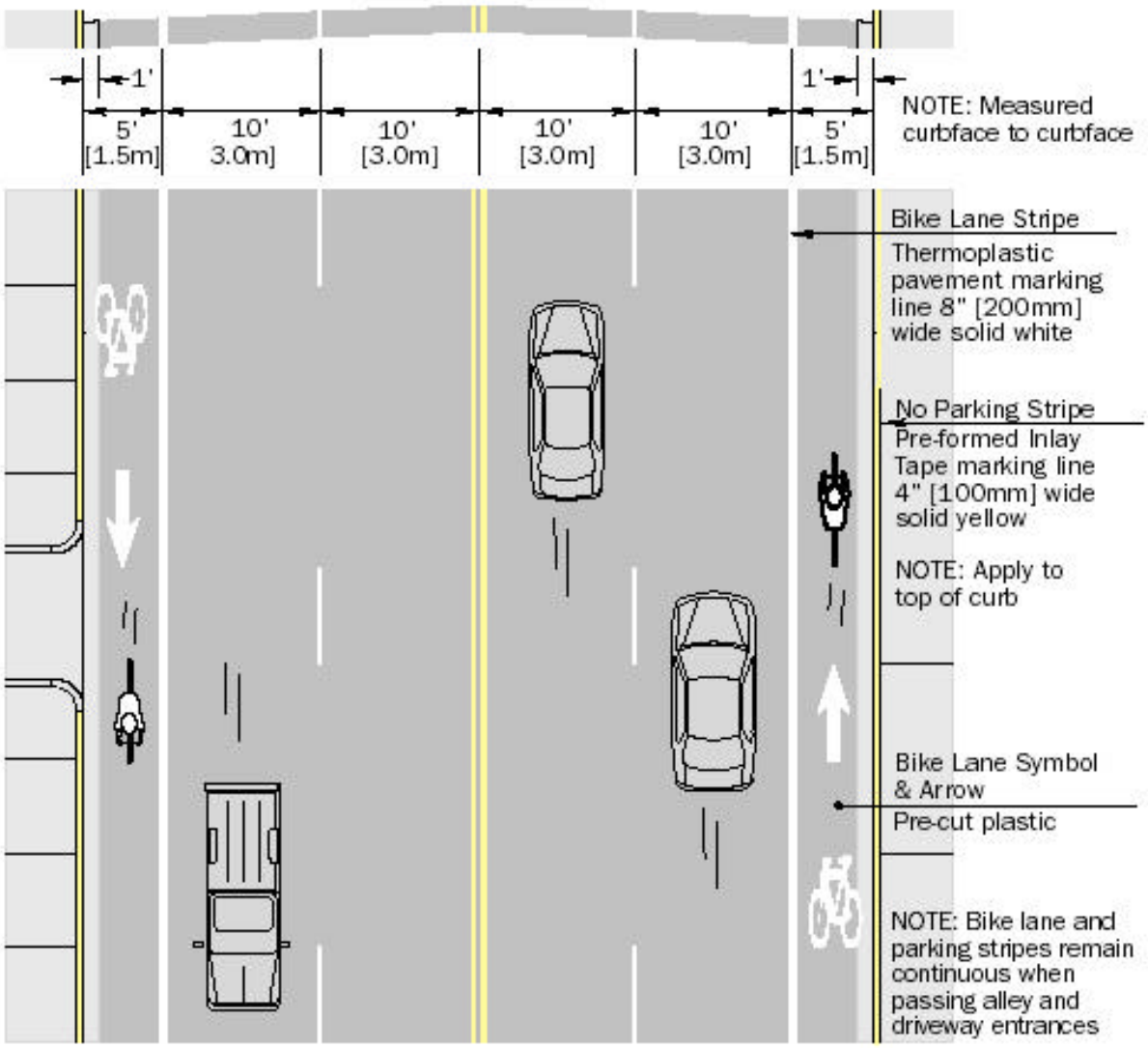
Bike Lane on 50' Wide Street
No Parking on Both Sides



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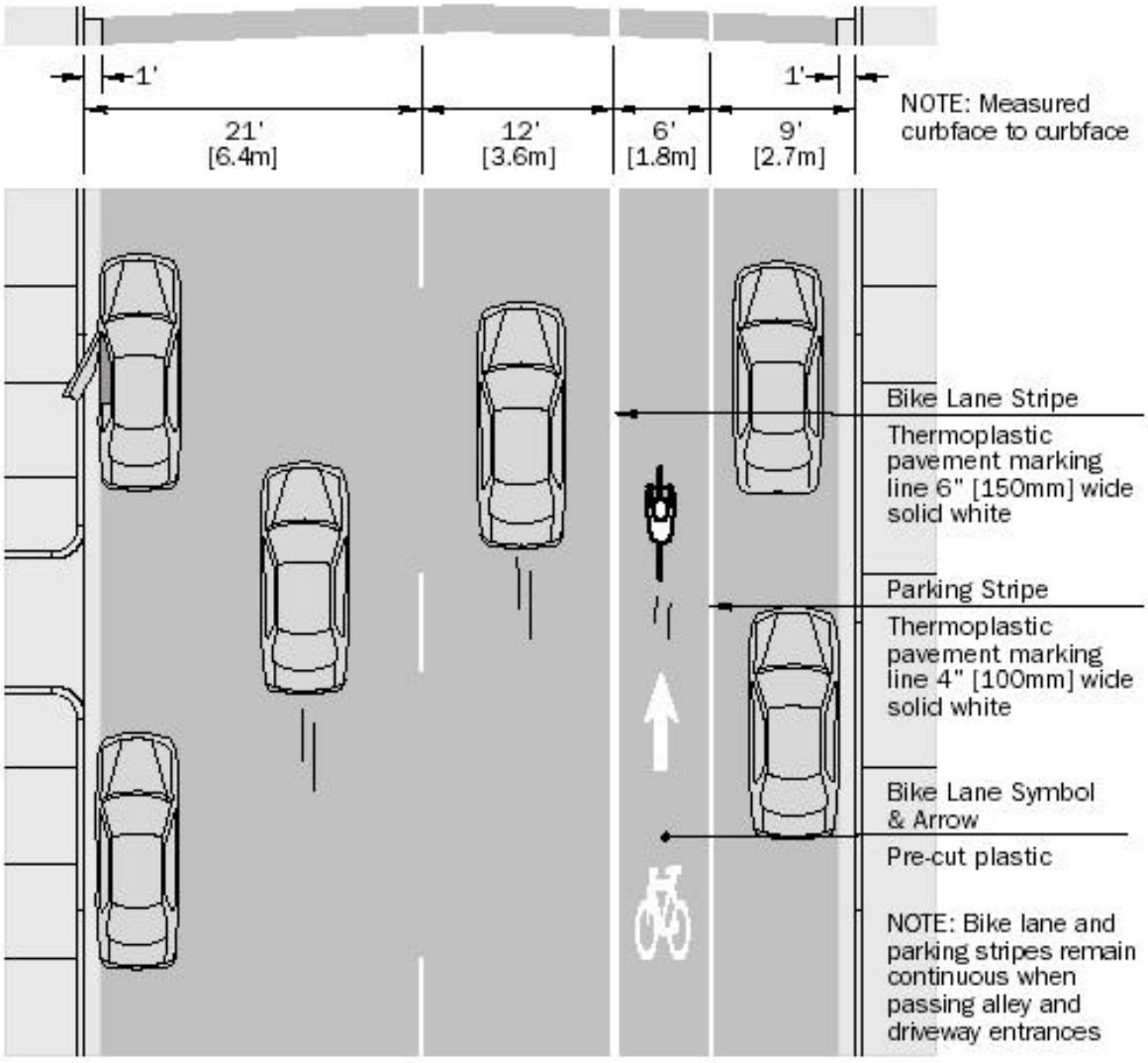
CITY OF CHICAGO		
50' Wide Street with Bike Lane		
REVISED 5-16-02	SCALE 1"=10'	
H:\Traffic\Bike Lanes\Design Manual\Mid-block\2w_np\50'.fh8		No. __ of __

48' Wide One-way Street
Parking on Both Sides



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CITY OF CHICAGO		
48' Wide One-way Street		
REVISED 5-16-02	SCALE 1"=10'	
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APPENDIX C:
Share the Streets Advisory Committee Members

Peter Chapman
Bruce Crowder
Matthew Feiner
Vincent Giroud
David Hiller
Elaine Lewinnek
Tom Madera
Alex Marathas
Kari Nortdstrom
Christopher Ozyck
Jason Schwaber

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APPENDIX D:
Specific Needs for Improvement Identified by Residents

Residents have identified a number of specific improvements to make streets friendlier to bikes and pedestrians. Residents identified needs for additional bike parking, better lighting, repaving and street repair, improved regular maintenance, and more handicapped access. The specific locations identified as needing improvement are listed below by category.

Additional Bike Parking

- Addition of at least 45 more bike parking spaces at Union Station.
- Provide bike parking at the new State Street train station.
- Addition and prominent placement of bike racks on the New Haven Green proper. Possible "bike-check" (a fenced off area with an attendant) for special large events.

Lighting:

- Fix the overhead light on the northbound side of State Street behind the Knights of Columbus Museum.
- Provide adequate lighting for highway underpasses; specifically Chapel Street in Fair Haven and Humphrey Street just east of State Street.
- Install blinking lights at Trumball and Lincoln.
- Install blinking lights at Bradley and Whitney.

Streets identified as needing repaving:

- Forest Avenue
- Wintergreen Avenue, north of Springside Street
- Edwards Street, east of Whitney (uneven patching from sewer project)
- Olive Street, between Water and Grand
- Pine Rock Avenue, north of Fitch Street
- Whitney Avenue, between Edwards and Sachem streets
- Chapel Street in Fair Haven

Regular maintenance:

- Regularly sweep Chapel Street east of East Street.
- Remove debris from Whitney Street.
- Regularly sweep Chapel Street in Fair Haven.
- Regularly sweep highway underpasses including.

Improved handicapped access:

- Install a handicapped ramp at the terminus of the bike path near the corner of Hillhouse Avenue and Sachem Street.
- Rebuild the handicapped access ramps all along the north side of Whitney Avenue.

- Install “State Law, Vehicles Must Yield to Pedestrians in Crosswalk” sign in the crosswalk of Trumball and Lincoln Streets.